Docket No.: 60188-432

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of : Customer Number: 20277

Yoshiaki HASEGAWA, et al. : Confirmation Number: 7630

Serial No.: 09/993,771
Patent No.: 6,709,881 : Group Art Unit: 2812

Filed: November 27, 2001
Issued: March 23, 2004 : Examiner: SAVITRI MULPURI

For: METHOD FOR MANUFACTURING SEMICONDUCTOR LASER OPTICAL DEVICE (As Amended)

REQUEST FOR CERTIFICATE OF CORRECTION UNDER 37 CFR 1.322

Mail Stop
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

In reviewing the above-identified patent, a printing error was discovered therein requiring correction in order to conform the Official Record in the application.

The error noted is set forth on the two attached copies of form PTO-1050 Rev. 2-93 in the manner required by the Commissioner's Notice.

Specifically, On the Title Page of the Letters Patent and Column One;, Under section "(54)" and under column one, change " METHOD FOR MANUFACTURING SEMICONDUCTOR AND METHOD FOR MANUFACTURING SEMICONDUCTOR DEVICE " to – METHOD FOR MANUFACTURING SEMICONDUCTOR LASER OPTICAL DEVICE –. For your immediate reference attached is a photocopy of the Part B-Fee Transmittal (form PTOL-85), filed November 24, 2003 and Amendment filed April 7, 2003.

The change requested herein occurred as a result of printing the Letters Patent and the Certificate should be issued without expense under Rule 322 of the Rules of Practice. Accordingly, Applicants request issuance of the Certificate of Correction.

Please charge any shortage in fees due in connection with the filing of this paper to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

MCDERMOTT WILL & EMERY LLP

Michael E. Fogarty
Registration No. 36,139

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Date: July 7, 2004

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UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 6,709,881 B2

DATED : March 23, 2004

INVENTOR(S) : Yoshiaki HASEGAWA, et al.

It is certified that error appears in the above-identified patent and that said Letter Patent is hereby corrected as shown below:

On the Title Page of the Letters Patent and Column One;

Under section "(54)" and under column one, change " METHOD FOR MANUFACTURING SEMICONDUCTOR AND METHOD FOR MANUFACTURING SEMICONDUCTOR DEVICE " to – METHOD FOR MANUFACTURING SEMICONDUCTOR LASER OPTICAL DEVICE –

MAILING ADDRESS OF SENDER:
McDermott Will & Emery LLP
600 13th Street, NW
Washington, DC 20005
USA

PATENT NO.
6,709,881

No. of add'l copies
@ 50¢ per page

FORM **PTO 1050** (Rev. 2-93)

12 JUL 2004

OIPE JC17 PATENT & TRADEMARK OFFICE JUL 07 2004

ART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail Mail Stop ISSUE FEE
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22204 7590 09/23/2003

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600 13th Street, N.W.
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(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/993,771	11/27/2001	Yoshiaki Hasegawa	~~0819-0703~~ 60188-432	7630

TITLE OF INVENTION: METHOD FOR MANUFACTURING SEMICONDUCTOR LASER OPTICAL DEVICE

APPLN. TYPE	SMALL ENTITY	ISSUE FEE	PUBLICATION FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	~~$1300~~ 1330 -	$300	~~$1600~~ 1630 -	12/23/2003

EXAMINER	ART UNIT	CLASS-SUBCLASS
MULPURI, SAVITRI	2812	438-024000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 McDERMOTT, WILL & EMERY
2
3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. Inclusion of assignee data is only appropriate when an assignment has been previously submitted to the USPTO or is being submitted under separate cover. Completion of this form is NOT a substitute for filing an assignment.

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MATSUSHITA ELECTRIC INDUSTRIAL CO., LTD. Osaka, JAPAN

Please check the appropriate assignee category or categories (will not be printed on the patent); ☐ individual ☒ corporation or other private group entity ☐ government

4a. The following fee(s) are enclosed:

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(Authorized Signature) (Date)

Michael E. Fogarty Reg.#36,139 11/24/2003

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This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, Alexandria, Virginia 22313-1450.

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12 JUL 2004

IN THE UNITED STAT PATENT AND TRADEMARK OI CE

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2. Fee Transmittal Form with Certificate of Mailing
3. Amendment (12 pages)
4. Request for Extension of Time
5. Check No. _____ in the amount of $110.00 (EOT-$110.00)

In re Patent Application of:
Inventor(s): Yoshiaki HASEGAWA et al.
Serial No.: 09/993,771
Filed: November 27, 2001
Title: METHOD FOR MANUFACTURING SEMICONDUCTOR AND METHOD FOR MANUFACTURING SEMICONDUCTOR DEVICE

Due Date: 04-20-03 **DRS/JWM/adc**
Docket No. 740819-703 **Date: 04-7-03**

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NIXON PEABODY LLP ATTORNEYS AT LAW

PATENT DISBURSEMENT ACCOUNT
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Suite 800
McLean, VA 22102

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740819-703

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TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application Number	09/993,771
Filing Date	November 27, 2001
First Named Inventor	Yoshiaki HASEGAWA et al.
Group Art Unit	2812
Examiner Name	Mulpuri, Savitri
Total Number of Pages in This Submission	
Attorney Docket Number	740819-703

ENCLOSURES *(check all that apply)*

- [x] Fee Transmittal Form
  - [x] Fee Attached
- [x] Amendment / Reply
  - [ ] After Final
  - [ ] Affidavits/declaration(s)
- [x] Extension of Time Request
- [ ] Express Abandonment Request
- [ ] Information Disclosure Statement
- [ ] Certified Copy of Priority Document(s)
- [ ] Response to Missing Parts/ Incomplete Application
  - [ ] Response to Missing Parts under 37 CFR 1.52 or 1.53
- [ ] Assignment Papers *(for an Application)*
- [ ] Drawing(s)
- [ ] Declaration and Power of Attorney
- [ ] Licensing-related Papers
- [ ] Petition
- [ ] Petition to Convert to a Provisional Application
- [ ] Power of Attorney, Revocation Change of Correspondence Address
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- [ ] Appeal Communication to Board of Appeals and Interferences
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- [ ] Proprietary Information
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- [ ] Application Data Sheet
- [ ] Other Enclosure(s) *(please identify below)*:

Remarks

[x] The Commissioner is hereby authorized to charge any additional fees required or credit any overpayments to Deposit Account No. 19-2380 (740819-703) for the above identified docket number.

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm *or* Individual name	Jeffrey L. Costellia, Reg. No. 35,483 Nixon Peabody LLP 8180 Greensboro Drive Suite 800 McLean, VA 22102
Signature	
Date	April 7, 2003

CERTIFICATE OF MAILING

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Signature	April Campbell	Date	April 7, 2003

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NVA260920.1

PTO/SB/17 (10-02)
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FEE TRANSMITTAL FOR FY 2003

Patent fees are subject to annual revision.

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT	($)110.00

Complete if Known	
Application Number	09/993,771
Filing Date	November 27, 2001
First Named Inventor	Yoshiaki HASEGAWA et al.
Examiner Name	Mulpuri, Savitri
Art Unit	2812
Attorney Docket No.	740819-703

METHOD OF PAYMENT *(check all that apply)*

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FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
1001	750	2001	375	Utility filing fee	
1002	330	2002	165	Design filing fee	
1003	520	2003	260	Plant filing fee	
1004	750	2004	375	Reissue filing fee	
1005	160	2005	80	Provisional filing fee	

SUBTOTAL (1) ($) 0

2. EXTRA CLAIM FEES FOR UTILITY AND REISSUE

		Extra Claims		Fee from below		Fee Paid
Total Claims	-20** =		X		=	0
Independent Claims	-3** =		X		=	0
Multiple Dependent			X		=	0

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
1202	18	2202	9	Claims in excess of 20
1201	84	2201	42	Independent claims in excess of 3
1203	280	2203	140	Multiple dependent claim, if not paid
1204	84	2204	42	** Reissue independent claims over original patent
1205	18	2205	9	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($) 0

**or number previously paid, if greater; For Reissues, see above

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	
1051	130	2051	65	Surcharge – late filing fee or oath	
1052	50	2052	25	Surcharge - late provisional filing fee or cover sheet	
1053	130	1053	130	Non-English specification	
1812	2,520	1812	2,520	For filing a request for *ex parte* reexamination	
1804	920*	1804	920*	Requesting publication of SIR prior to Examiner action	
1805	1,840*	1805	1,840*	Requesting publication of SIR after Examiner action	
1251	110	2251	55	Extension for reply within first month	110.00
1252	410	2252	205	Extension for reply within second month	
1253	930	2253	465	Extension for reply within third month	
1254	1,450	2254	725	Extension for reply within fourth month	
1255	1,970	2255	985	Extension for reply within fifth month	
1401	320	2401	160	Notice of Appeal	
1402	320	2402	160	Filing a brief in support of an appeal	
1403	280	2403	140	Request for oral hearing	
1451	1,510	1451	1,510	Petition to institute a public use proceeding	
1452	110	2452	55	Petition to revive – unavoidable	
1453	1,300	2453	650	Petition to revive – unintentional	
1501	1,300	2501	650	Utility issue fee (or reissue)	
1502	470	2502	235	Design issue fee	
1503	630	2503	315	Plant issue fee	
1460	130	1460	130	Petitions to the Commissioner	
1807	50	1807	50	Processing fee under 37 CFR 1.17(q)	
1806	180	1806	180	Submission of Information Disclosure Stmt	
8021	40	8021	40	Recording each patent assignment per property (times number of properties)	
1809	750	2809	375	Filing a submission after final rejection (37 CFR 1.129(a))	
1810	750	2810	375	For each additional invention to be examined (37 CFR 1.129(b))	
1801	750	2801	375	Request for Continued Examination (RCE)	
1802	900	1802	900	Request for expedited examination of a design application	

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SUBTOTAL (3) ($)110.00

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April Campbell

Name: April Campbell

SUBMITTED BY

Name *(Print/Type)*	Jeffrey L. Costellia	Registration No. *(Attorney/Agent)*	35,483	Telephone	(703) 770-9300
Signature				Date	April 7, 2003

Complete *(if applicable)*

NVA260923.1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of	)	
Yoshiaki HASEGAWA et al.	)	Art Unit: 2812
Serial No. 09/993,771	)	
Filed: November 27, 2001	)	Examiner: Mulpuri, Savitri
For: METHOD FOR MANUFACTURING SEMICONDUCTOR AND METHOD FOR MANUFACTURING SEMICONDUCTOR DEVICE	)	

CERTIFICATE OF MAILING

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April Campbell

April Campbell

AMENDMENT

Honorable Commissioner of Patents
Washington, D.C. 20231

Sir:

The following is presented in response to the Office Action mailed December 20, 2002, in connection with the above-identified patent application. Please amend the above identified patent application as follows:

In accordance with the guidelines and waived provisions of 37 C.F.R. 1.121 promulgated in the USPTO announcement of January 31, 2003, please make the following amendments.

IN THE SPECIFICATION:

Before the first line of the specification, please replace the current title of the invention with the following new title of the invention:

~~METHOD FOR MANUFACTURING SEMICONDUCTOR AND METHOD FOR MANUFACTURING SEMICONDUCTOR DEVICE~~ METHOD FOR MANUFACTURING SEMICONDUCTOR LASER OPTICAL DEVICE

IN THE CLAIMS:

1. (Cancelled)

2. (Cancelled)

3. (Cancelled)

4. (Currently Amended) ~~The method for manufacturing a semiconductor of claim 1~~ A method for manufacturing a semiconductor laser optical device, comprising:

a first step of forming an etching stop layer on a first semiconductor layer; and

a second step of forming a second semiconductor layer made of a group III-V compound semiconductor on the etching stop layer,

wherein an etching rate for the etching stop layer by dry etching is less than an etching rate for the second semiconductor layer, and ~~wherein~~ in the first step, the etching stop layer is a super lattice layer obtained by alternately layering an $Al_xGa_{1-x}N$ layer (where $0 \leq x \leq 1$) and an $Al_yGa_{1-y}N$ layer (where $0 \leq y \leq 1$ and $x \neq y$) on one another, thereby functioning as a reflector mirror having a thickness such as to reflect light whose wavelength is equal to or greater than about 360 nm and less than or equal to 500 nm, and

the thickness of each $Al_xGa_{1-x}N$ and each $Al_yGa_{1-y}N$ layer is $\lambda / (4n)$ wherein λ denotes an oscillation wavelength of the semiconductor laser optical device, and n denotes a refractive index of each $Al_xGa_{1-x}N$ layer and each $Al_yGa_{1-y}N$ layer.

5. (Cancelled)

6. (Cancelled)

7. (Currently Amended) ~~The method for manufacturing a semiconductor of claim 6, wherein the element included in the group III-V nitride semiconductor is nitrogen, and the impurity element is silicon~~ A method for manufacturing a semiconductor laser optical device, comprising:

a first step of forming an etching stop layer on a first semiconductor layer; and

a second step of forming a second semiconductor layer made of a group III-V compound semiconductor on the etching stop layer,

wherein an etching rate for the etching stop layer by dry etching is less than an etching rate for the second semiconductor layer, and the etching stop layer is made of an insulating film composed of silicon nitride.

8. (Currently Amended) ~~The method for manufacturing a semiconductor of claim 6,~~ A method for manufacturing a semiconductor laser optical device, comprising:

a first step of forming an etching stop layer on a first semiconductor layer; and

a second step of forming a second semiconductor layer made of a group III-V compound semiconductor on the etching stop layer,

wherein an etching rate for the etching stop layer by dry etching is less than an etching rate for the second semiconductor layer, the first semiconductor layer includes magnesium, the etching stop layer is made of an element included in a group III-V nitride semiconductor and an impurity element that determines a conductivity of the group III-V nitride semiconductor, and ~~wherein~~ the impurity element is magnesium, and an amount of magnesium included in the etching stop layer is more than an amount of magnesium included in the first semiconductor layer.

9. (Currently Amended) The method for manufacturing a semiconductor laser optical device of claim 8, wherein ~~an impurity concentration~~ the amount of magnesium included in the etching stop layer is about 1×10^{20} cm^{-3} or more.

10. (Cancelled)

11. (Currently Amended) ~~The method for manufacturing a semiconductor of claim 10,~~ A method for manufacturing a semiconductor laser optical device, comprising:

a first step of forming an etching stop layer on a first semiconductor layer; and

a second step of forming a second semiconductor layer made of a group III-V

compound semiconductor and including Al on the etching stop layer,

wherein an etching rate for the etching stop layer by dry etching is less than an etching rate for the second semiconductor layer,

the method further comprises a third step of performing a dry etching process on the second semiconductor layer, after the second step, wherein in the third step,

the etching process on the second semiconductor layer is stopped upon detecting the etching stop layer, the etching stop layer includes Al, an amount of Al included in the etching stop layer is more than an amount of Al included in the second semiconductor layer, and ~~wherein~~ the third step includes the steps of:

irradiating a surface of the second semiconductor layer with a laser beam;

receiving photoluminescence light emitted through excitation by the laser beam; and

assuming that a surface of the etching stop layer has been exposed ~~by detecting a change in~~ when a wavelength of the received photoluminescence light is shortened.

12. (Currently Amended) ~~The method for manufacturing a semiconductor of claim 10,~~ A method for manufacturing a semiconductor laser optical device, comprising:

a first step of forming an etching stop layer on a first semiconductor layer; and

a second step of forming a second semiconductor layer made of a group III-V compound semiconductor and including Al on the etching stop layer,

wherein an etching rate for the etching stop layer by dry etching is less than an etching rate for the second semiconductor layer,

the method further comprising a third step of performing a dry etching process on the second semiconductor layer, after the second step, wherein in the third step, the etching process on the second semiconductor layer is stopped upon detecting the etching stop layer, the etching stop layer includes Al, an amount of Al included in the etching

stop layer is more than an amount of Al included in the second semiconductor layer, and ~~wherein~~ the third step includes the steps of:

irradiating a surface of the second semiconductor layer with X rays;

measuring a diffraction angle of the X rays; and

assuming that a surface of the etching stop layer has been exposed ~~by detecting a change in~~ when the diffraction angle ~~of the X rays~~ increases.

13. (Cancelled)

REMARKS

The Examiner's Office Action dated December 20, 2002 has been received and its contents carefully noted. The Applicants respectfully submit that this response is timely filed and fully response to the Office Action. By the above amendments, claims 4, 7, 8, 9, 11 and 12 have been amended, and claims 1-3, 5, 6, 10 and 13 have been cancelled. Consequently, claims 4, 7, 8, 9, 11 and 12 are currently pending. Support for the presently claimed subject matter is as follows:

Claim 4 is supported by page 25, line 10, to page 26, line 2,

Claim 7 is supported by page 6, lines 4-11,

Claim 8 is supported by page 41, lines 2-8,

Claim 11 is supported by page 30, line 25, to page 31, line 10,

Claim 12 is supported by page 33, lines 10-22, of the specification.

In light of the above amendments and detailed arguments to follow, reconsideration of the currently proposed rejections, including the rejection of claim "9-12" (which apparently should have been claims 10-12), under § 112 (second paragraph), is respectfully requested.

With regard to the other rejections of:

Claims 1-3, 6, 8 and 13, under 35 U.S.C. 102(e), as being anticipated by the teachings of Nakamura et al. (US 2002/0167018),

Claims 4 5 and 7, under 35 U.S.C. 103(a), as being obvious in view of the teachings of Nakamura et al. (US 2002/0167018) combined with the teachings of Ono et al. ('835), and

Claims 11 and 12, under 35 U.S.C. 103(a), as being obvious in view of the teachings of Nakamura et al. (US 2002/0167018) combined with the teachings of the Chen et al. (J. of Appl. Physics) article,

each of these rejections is respectfully traversed.

The presently claimed invention of independent claim 4 sets forth the features that the etching stop layer functions as a reflective mirror and is composed of a super lattice layer obtained by alternating layers of $Al_xGa_{1-x}N$ and $Al_yGa_{1-y}N$, and a thickness of each $Al_xGa_{1-x}N$ layer and each $Al_yGa_{1-y}N$ layer is $\lambda / (4n)$ (where, λ denotes an oscillation wavelength of the semiconductor laser optical device, and n denotes a refractive index of each $Al_xGa_{1-x}N$ layer and each AlyGa1-yN layer). With this configuration, the super lattice layer becomes the Bragg reflector mirror during light-emission of the semiconductor laser optical device, and leakage of light from the active layer to the outside can be prevented.

The presently claimed invention of independent claim 7 sets forth the feature that the etching stop layer is made of an insulating film composed of silicon nitride in order that the etching selectivity ratio between the silicon nitride and the second semiconductor layer can be increased, thereby improving the etching controllability for the second semiconductor layer.

The presently claimed invention of independent claim 8 sets forth the features the etching stop layer and the first semiconductor layer include magnesium, and the amount of magnesium included in the etching stop layer is more than an amount of magnesium included in the first semiconductor layer.

The presently claimed invention of independent claim 11 sets forth the features that the amount of Al included in the etching stop layer is more than the amount of Al included in the second semiconductor layer, the wavelength of the photoluminescence light is emitted through excitation by the laser beam, and, by utilizing the differences caused by the composition of the surface on which the laser beam is irradiated, it is assumed (determined) the surface of the etching stop layer has been exposed when the wavelength of the photoluminescence light is shortened.

The presently claimed invention of independent claim 12 sets forth the features that the amount of Al included in the etching stop layer is more than the amount of Al

included in the second semiconductor layer, the diffraction angle is measured when the X ray irradiated, and by utilizing the differences caused by the composition of the surface on which the X ray is irradiated, it is assumed (determined) that the surface of the etching stop layer has been exposed when the diffraction angle increases.

Neither Nakamura et al. (US2002/0167018 A1) (hereinafter "Nakamura"), Ono (U.S. Patent No. 5,757,835) (hereinafter "Ono") and/or the Chen et al. article (hereinafter "Chen"), teach or suggest each of the above features of claims 4, 7, 8, 11 and 12.

With regard to claim 4, Nakamura fails to disclose the super lattice layer specifically claimed; while Ono (which is not discussed at all by the Examiner's rejection of claims 4, 5 and 7 under § 103(a)) teaches using a super lattice layer as an etching stop layer, but fails to teach or suggest that by setting the thickness of each layer of the alternating layers forming the super lattice layer to $\lambda / (4n)$ the super lattice layer becomes a reflective mirror when the semiconductor laser optical device is emitted.

Further, according to the amended claim 4, leakage of light from the active layer to the outside can be prevented when the etching stop layer is used as a reflective mirror composed of the super lattice layer. However, Ono also fails to discuss the leakage of light from the active layer. Since both Nakamura and Ono fail to disclose the above features of amended claim 4, a *prima facie* case of obviousness has not been set forth under § 103(a), and claim 4 is therefore patentable over Nakamura and Ono, either individually or in combination.

With regard to amended claim 7, the etching stop layer is made of an insulating film composed of silicon nitride. Indeed, it is well known that in order to achieve an n-type semiconductor having GaN as a main constituent, the semiconductor is doped with Si. However, it is also well known that such Si doped GaN is conductive. Hence, even if the semiconductor disclosed in Nakamura and Ono has GaN as a main constituent, and is doped with Si in order to obtain an n-type semiconductor, the semiconductor does not

become an insulating film as presently claimed. Since both Nakamura and Ono fail to disclose the above features of amended claim 7, a *prima facie* case of obviousness, under § 103(a), has not been set forth, and claim 7 is therefore patentable over Nakamura and Ono, either individually or in combination.

With regard to amended claim 8, the amount of magnesium included in the etching stop layer is more than an amount of magnesium included in the first semiconductor layer. However, Nakamura, at paragraph [0048], discloses that the density of Mg included in the etching stop layer (17) is $1 \times 10^{18}cm^{-3}$, which is the same as that included in the second p-type cladding layer (11). Further, the density of Mg included in the p-type contact layer (10) deposited on the second p-type cladding layer (11) is $5 \times 10^{18}cm^{-3}$, which is more that included in the etching stop layer (17). Nakamura also fails to disclose utilizing the differences in the amount of Mg to differentiate the etching rate. Therefore, since Nakamura fails to disclose the presently claimed difference in the amount of magnesium included in the etching stop layer and the first semiconductor layer as set forth in claim 8, anticipation is not established with regard to claim 8 by the Nakamura reference. Hence, the presently amended claim 8 is patentable over Nakamura.

Further, neither Ono or the Chen article disclose or suggest the claimed Mg density of the layers of the presently amended claim 8. Therefore, the amended claim 8 is patentable over Nakamura, Ono and Chen either individually or in combination.

With regard to amended claim 11, by utilizing the differences caused by the composition of the surface on which the laser beam is irradiated, it can be assumed (determined) that the surface of the etching stop layer has been exposed when the wavelength of the photoluminescence light is shortened. Neither Nakamura or the Chen article teach or suggest this feature. Specifically, the Chen articles discloses:

> "We use the photoluminescence (PL) technique to study the optical quality of the etched GaN surface"

at page 649, right column (lines 14-15).

However, Chen fails to teach or suggest the presently claimed phenomenon that the measured wavelength of the photoluminescence light is shortened when the amount of Al on the surface of the semiconductor irradiated by the laser beam increases, and utilizing this phenomenon to assume (determine) the surface of the etching stop layer has been exposed.

The Chen article also discloses:

"We observed a wavelength shift of the yellow luminescence (YL) peak"

in page 649, right column (lines 13-14). However, the authors fail to disclose the relationship between the wavelength shift of the yellow luminescence (YL) peak and the nitride semiconductor composed of AlGaN. Additionally, according to the "Ti/Al" layer disclosed at page 649, right column (line 16), it is obvious that "Ti/Al" is a metal layer and not a nitrided semiconductor composed of AlGaN. Since both Nakamura and the Chen article fail to disclose the above features of amended claim 11, a *prima facie* case of obviousness, under § 103(a), has not been set forth, and claim 11 is therefore patentable over the combination of teachings of Nakamura and Chen.

With regard to amended claim 12, by utilizing the differences caused by the composition of the surface on which the X ray is irradiated, it can be assumed (determined) that the surface of the etching stop layer has been exposed when the diffraction angle increases. Nakamura fails to teach or suggest the diffraction angle measured when the X ray irradiates; while the Chen article discloses:

> "Also, the near surface structure of GaN was studied by low angle X-ray diffraction"

in page 649, right column (line 19) to page 650, left column (line 2). However, the Chen article fails to teach or suggest the phenomenon that the measured diffraction angle increases when the amount of Al on the surface of the semiconductor irradiated by the X ray increases, and fails to teach utilizing the phenomenon to assume (determine) that the

surface of the etching stop layer has been exposed. Since both Nakamura and the Chen article fail to disclose the above features of amended claim 12, a *prima facie* case of obviousness, under § 103(a), has not been set forth, and claim 12 is therefore patentable over the combination of teachings of Nakamura and Chen.

While the present application is now believed to be in condition for allowance, should the Examiner find some issue to remain unresolved, or should any new issues arise, which could be eliminated through discussions with Applicants' representative, then the Examiner is invited to contact the undersigned by telephone in order that the further prosecution of this application can thereby be expedited.

Lastly, it is noted that a separate Extension of Time Petition (one month) accompanies this response along with a check in payment of the requisite extension of time fee. However, should that petition become separated from this Amendment, then this Amendment should be construed as containing such a petition. Likewise, any overage or shortage in the required payment should be applied to Deposit Account No. 19-2380 (740819-703).

Respectfully submitted,

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